

WHAT IS CLAIMED IS:

1. A method for forwarding results of a first instruction to operand inputs of an execution unit, the method comprising forwarding the results of the first instruction to a first operand input of the execution unit and not to a second operand input of the execution unit.
2. The method of claim 1, further comprising:
 - (a) loading a second instruction into an instruction register, the second instruction having first and second source register fields;
 - (b) determining, with a forwarding controller, whether the first or second source register field specifies the results of the first instruction as an operand source of the second instruction; and
 - (c) if the first source register field specifies the results of the first instruction as an operand source of the second instruction, selecting a first source register corresponding to the second source register field and applying a content of the first source register to the second operand input of the execution unit, and
if the second source register field specifies the results of the first instruction as an operand source of the second instruction, selecting a second source register corresponding to the first source register field and applying a content of the second source register to the second operand input of the execution unit.
3. The method of claim 2, wherein the step of determining with a forwarding controller whether the first or second source register field specifies the results of the first instruction as an operand source of the second instruction comprises comparing, with the forwarding controller, a target register field of the first instruction and the first and second source register fields of the second instruction.
4. The method of claim 2, wherein the step (c) of claim 2 comprises:
providing a switch configured to receive the first and second source register fields of the second instruction;

providing a register file coupled to the switch via a first connection line and coupled to the second operand input of the execution unit via a second connection line; and

if the first source register field specifies the results of the first instruction as an operand source of the second instruction, passing with the switch the second source register field to the register file via the first connection line to select the first source register in the register file and applying the content of the first source register to the second operand input of the execution unit via the second connection line, and

if the second source register field specifies the results of the first instruction as an operand source of the second instruction, passing with the switch the first source register field to the register file via the first connection line to select the second source register in the register file and applying the content of the second source register to the second operand input of the execution unit via the second connection line.

5. The method of claim 4, further comprising:

providing a third connection line coupling the register file and the switch; and
if the first source register field specifies the results of the first instruction as an operand source of the second instruction, passing with the switch the first source register field to the register file via the third connection line, and

if the second source register field specifies the results of the first instruction as an operand source of the second instruction, passing with the switch the second source register field to the register file via the third connection line.

6. The method of claim 1, further comprising:

(a) loading the first instruction and a second instruction following the first instruction into a forwarding flag generator, the second instruction having first and second source register fields;

(b) determining, with the forwarding flag generator, whether the first or second source register field of the second instruction specifies the results of the first instruction as an operand source of the second instruction;

(c) if the first source register field specifies the results of the first instruction as an operand source of the second instruction, loading the second instruction into an instruction register, selecting a first source register corresponding to the second source register field, and applying a content of the first source register to the second operand input of the execution unit, and

if the second source register field specifies the results of the first instruction as an operand source of the second instruction, replacing the content of the second source register field with that of the first source register field, loading the second instruction into an instruction register, selecting a second source register corresponding to the second source register field, and applying a content of the second source register to the second operand input of the execution unit.

7. The method of claim 6, further comprising:

generating, with the forwarding flag generator, forwarding flags indicating whether the first or second source register field of the second instruction specifies the results of the first instruction as an operand source of the second instruction;

loading the forwarding flags into the instruction register along the second instruction; and

passing the forwarding flags from the instruction register to the execution unit to select as inputs the results of the first instruction among a plurality of inputs from a plurality of execution units.

8. The method of claim 6, wherein the step of determining, with the forwarding flag generator, whether the first or second source register field specifies the results of the first instruction as an operand source of the second instruction comprises comparing, with the forwarding flag generator, a target register field of the first instruction and the first and second source register fields of the second instruction.

9. The method of claim 6, wherein the step of selecting the first or second source register corresponding to the second source register field comprises:

providing a register file configured to receive the second source register field of the second instruction in the instruction register via a first connection line; and

passing the content of the second source register field to the register file via the first connection line to select the first or second source register.

10. The method of claim 9, further comprising:

providing a second connection line coupling the register file and the first source register field of the second instruction in the instruction register; and

if the first source register field specifies the results of the first instruction as an operand source of the second instruction, passing the first source register field of the second instruction to the register file via the second connection line, and

if the second source register field specifies the results of the first instruction as an operand source of the second instruction, replacing the content of the first source register field with that of the second source register field before loading the second instruction into the instruction register, and

passing the first source register field of the second instruction to the register file via the second connection line.

11. A digital circuit comprising an execution unit including first and second operand inputs wherein

the first operand input is configured to receive forwarded results of a first instruction; and

the second operand input is configured not to receive the forwarded results of the first instruction.

12. The digital circuit of claim 11, further comprising:

an instruction register configured to hold a second instruction having first and second source register fields;

a switch configured to receive the first and second source register fields of the second instruction;

a register file coupled to the switch and the second operand input of the execution unit via first and second connection lines, respectively; wherein

if the first source register field specifies the forwarded results of the first instruction as an operand source of the second instruction, the switch passes the

content of the second source register field to the register file via the first connection line to select a first source register and the register file passes a content of the first source register to the second operand input of the execution unit via the second connection;

if the second source register field specifies the forwarded results of the first instruction as an operand source of the second instruction, the switch passes the content of the first source register field to the register file via the first connection line to select a second source register and the register file passes a content of the second source register to the second operand input of the execution unit via the second connection.

13. The digital circuit of claim 12, further comprising a third connection line coupling the switch and the register file wherein

if the first source register field specifies the forwarded results of the first instruction as an operand source of the second instruction, the switch passes the content of the first source register field to the register file via the third connection line, and

if the second source register field specifies the forwarded results of the first instruction as an operand source of the second instruction, the switch passes the content of the second source register field to the register file via the third connection line.

14. The digital circuit of claim 13, further comprising a forwarding controller configured to

receive the first and second source register fields of the second instruction, determine if the first or second source register field of the second instruction specifies the forwarded results of the first instruction as an operand source of the second instruction, and

cause the switch to pass one of the first and second source register fields to the register file via the first connection line.

15. The digital circuit of claim 14, wherein the forwarding controller is configured to compare the first and second source register fields of the second instruction and a target register field of the first instruction.

16. The digital circuit of claim 12, further comprising a forwarding controller configured to

- receive the first and second source register fields of the second instruction,
- determine if the first or second source register field of the second instruction specifies the forwarded results of the first instruction as an operand source of the second instruction, and
- cause the switch to pass one of the first and second source register fields to the register file via the first connection line.

17. The digital circuit of claim 16, wherein the forwarding controller is configured to compare the first and second source register fields of the second instruction and a target register field of the first instruction.

18. The digital circuit of claim 11, further comprising:

- a forwarding flag generator configured to receive the first instruction and a second instruction following the first instruction, the second instruction having first and second source register fields;
- an instruction register coupled to the forwarding flag generator via a first connection line; and
- a register file coupled to the instruction register via a second connection line and to the second operand input of the execution unit via a third connection line;

wherein

- the forwarding flag generator determines whether the first or second source register field of the second instruction specifies the forwarded results of the first instruction as an operand source of the second instruction, and
- if the first source register field of the second instruction specifies the forwarded results of the first instruction as an operand source of the second instruction, the forwarding flag generator sends the second instruction to the

instruction register via the first connection line, the instruction register sends a content of the second source register field of the second instruction to the register file via the second connection line to select a first source register, and the register file sends a content of the first source register to the second operand input of the execution unit via the third connection line, and

if the second source register field of the second instruction specifies the forwarded results of the first instruction as an operand source of the second instruction, the forwarding flag generator replaces the content of the second source register field of the second instruction with that of the first source register field, the forwarding flag generator sends the second instruction to the instruction register via the first connection line, the instruction register sends a content of the second source register field of the second instruction to the register file via the second connection line to select a second source register, and the register file sends a content of the second source register to the second operand input of the execution unit via the third connection line.

19. The digital circuit of claim 18, further comprising a fourth connection line coupling the instruction register and the register file, wherein

if the first source register field of the second instruction specifies the forwarded results of the first instruction as an operand source of the second instruction, the instruction register sends a content of the first source register field to the register file via the fourth connection line, and

if the second source register field of the second instruction specifies the forwarded results of the first instruction as an operand source of the second instruction, the forwarding flag generator replaces the content of the first source register field of the second instruction with an initial content of the second source register field before sending the second instruction to the instruction register via the first connection line, and the instruction register sends a content of the first source register field to the register file via the fourth connection line.

20. The digital circuit of claim 18, wherein

the forwarding flag generator generate forwarding flags indicating whether the first or second source register field of the second instruction specifies the forwarded results of the first instruction as an operand source of the second instruction,

the forwarding flag generator sends the forwarding flags along with the second instruction to the instruction register, and

the instruction register sends the forwarding flags to the first operand input of the execution unit causing the first operand input to select the forwarded results of the first instruction among a plurality of forwarded results from a plurality of execution units.